

What is claimed is:

1. A method of creating a transverse cavity in a bone comprising the steps of:
  - 5        inserting a tool having a tool body area, into a bone;
  - activating a blade pivotally mounted in and located in said tool body to swing
  - through an arc defining a transverse cavity;
  - said transverse cavity having an area larger than said tool body area.
- 10    2. The method of claim 1, wherein said blade is blunt.
3. The method of claim 1, wherein said blade includes a cutting surface.
4. The method of claim 1 wherein said transverse cavity is symmetric about a plane  
15    defined by the long axis of the blade in its initial position and a line normal to the  
     transverse plane to be created.
5. The method of claim 1 wherein said transverse cavity is asymmetric about the vertical  
20    axis.
6. A method of creating a transverse cavity in a bone comprising the steps of:
  - inserting a tool having a tool body area, into a bone;
  - activating a flexible element hinge mounted on and located in said tool body to
  - swing through an arc defining a transverse cavity;
  - 25        said transverse cavity having an area larger than said tool body area.
7. The method of claim 6 wherein said transverse cavity is symmetric about a plane  
     defined by the long axis of the flexible elements in their initial position and a line  
     normal to the transverse plane to be created.
- 30    8. The method of claim 6 wherein said transverse cavity is asymmetric about a vertical  
     axis.

9. A tool for creating a cavity in a bone comprising:

an elongated body having a distal end and having a proximal end, said body having an exterior diameter defining a tool body area for the tool;

a shearing element anchored to said distal end of said delivery tube by an anchor element;

said anchor element and said distal end of said delivery tube together forming a hinge to permit and to restrict said shearing element to move in a transverse plane;

whereby the motion of said shearing element in said transverse plane sweeps out a cutting arc, said cutting arc defining an area larger than said delivery area;

an actuator located within said delivery tube and connected to said shearing element;

whereby motion imparted to said actuator rod moves said shearing element through said cutting arc.

10. The tool of claim 9 wherein said shearing element is a blade.

11. The tool of claim 9 wherein said blade is blunt.

12. The tool of claim 9 wherein said blade includes a cutting surface.

13. The tool of claim 9 wherein said actuator includes a push-pull element coupled between said proximal end and said distal shearing element.

14. The tool of claim 9 wherein said actuator includes a cable pull element coupled between said proximal end and said distal shearing element.

15. The tool of claim 9 further including:

a handle indexed to said shearing element coupled to said elongate body at said proximal end.

16. The tool of claim 9 further including:

a finger loop handle indexed to said shearing element coupled to said elongate body at said proximal end.

17. The tool of claim 9 further including:

an electrical solenoid to provide power to said actuator.

5 18. The tool of claim 17 further including:

a high frequency forcing function superimposed on the solenoid drive signal  
generating an impacting force to said actuator.

19. The tool of claim 9 further including:

10 an pneumatic cylinder to provide power to said actuator.

20. The tool of claim 19 further including:

a high frequency forcing function superimposed on the pneumatic cylinder drive  
signal generating an impacting force to said actuator.

21. The tool of claim 9 further including:

an electro mechanical actuator to provide power to said actuator.

22. The tool of claim 21 further including:

a high frequency forcing function superimposed on the electro mechanical  
actuator drive signal generating an impacting force to said actuator.

23. A tool for creating a cavity in a bone comprising:

25 an elongated body having a distal end and having a proximal end, said body  
having an exterior diameter defining a tool body area for the tool;

at least one shearing element anchored to said distal end of said delivery tube by  
an anchor element;

said anchor element and said distal end of said delivery tube together forming a  
hinge to permit and to restrict said shearing element to move in a transverse plane;

30 whereby the motion of said shearing element in said transverse plane sweeps out  
a cutting arc, said cutting arc defining an area larger than said delivery area;

an actuator located within said delivery tube and connected to said shearing  
element;

whereby motion imparted to said actuator rod moves said shearing element through said cutting arc.

24. The device of claim 23 wherein said shearing element is a flexible bow element.

25. The device of claim 24 wherein said flexible bow element has a cross section that varies along its length.

26. The device of claim 23 wherein said bow has a sharp exterior edge for shearing bone.

27. The device of claim 23 wherein said bow has a set of sharp teeth members on said exterior edge for shearing bone.

28. The device of claim 23 wherein said bow element is blunt.

29. The device of claim 23 wherein said bow element is connected to said delivery tube at the distal end of said tube and said bow element is anchored to said actuator rod at the distal end of said actuator rod; whereby relative motion of said actuator rod toward said distal end of said tube forces said bow outwardly in said transverse cutting plane.

30. The device of claim 23 wherein said flexible element is located within a cover, which moves to accommodate the motion through an arc.

31. The device of claim 23 wherein said flexible bow element has a proximal end and a distal end wherein said flexible element has a constant mechanical strength from its distal end to its proximal end.

32. The device of claim 23 wherein said flexible element has a proximal end and a distal end and wherein said flexible element varies in mechanical strength from its distal end to its proximal end.

33. The device of claim 23 wherein said flexible element has a proximal end and a distal end and wherein said flexible element is constant in cross sectional area from its distal end to its proximal end.

5 34. The tool of claim 23 further including:

a handle indexed to said shearing element coupled to said elongate body at said proximal end.

35. The tool of claim 23 further including:

10 a finger loop handle indexed to said shearing element coupled to said elongate body at said proximal end.

36. The tool of claim 23 further including:

an electrical solenoid to provide power to said actuator rod.

37. The tool of claim 23 further including:

a pneumatic cylinder to provide power to said actuator rod.

38. The tool of claim 23 further including:

an electro mechanical actuator to provide power to said actuator rod.

39. The tool of claim 23 wherein the shearing element is constructed of a superelastic material.

25 40. A tool for creating a cavity in a bone comprising:

an elongated body having a distal end and having a proximal end, said body having a exterior diameter defining a tool body area for the tool;

a pair of shearing elements including a first shearing element and a second shearing element anchored to said distal end of said delivery tube by an anchor element;

said anchor element and said distal end of said delivery tube together forming a hinge to permit and to restrict each of said shearing elements to move in a transverse plane;

whereby the motion of either of said shearing elements in said transverse plane sweeps out a cutting arc, said cutting arc defining an area larger than said delivery area;

a first actuator rod located within said delivery tube and connected to said first shearing element;

5 a second actuator rod located within said delivery tube and connected to said second shearing element;

whereby motion imparted to said actuators rods moves said shearing elements through said cutting arc independently.

10 41. The device of claim 40 wherein said shearing elements are flexible bow elements.

42. The device of claim 41 wherein said bow elements have a sharp exterior edge for shearing bone.

15 43. The device of claim 41 wherein said bow elements have a set of sharp teeth members on said exterior edge for shearing bone.

20 44. The device of claim 41 wherein said bow elements are blunt.